
State of Tennessee
THE GREAT SEAL OF THE STATE OF TENNESSEE
XVI
AGRICULTURE
COMMERCE
1796

State of Tennessee

presented by

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State Architect
Office of the State Architect (OSA)

Steven G. Cates, PE
Commissioner
Department of General Services (DGS)

July 2012

Josh Shelton, el dorado

integrated design build practice

Scott Wolf, Miller Hull

a more efficient use of resources

Senator Andy Burke

we need to take a longer view and invest in the future

Marie and Keith Zawistowski

encouraging a variety of architectural business models

Larry Scarpa, Brooks + Scarpa

its remarkable what we got done for our client within their budget and in a very short time frame

Earl Swensson, Earl Swensson Associates

we Tennesseans can do anything we envision

Role of the State Architect

Provide operational and technical staff support to the State Building Commission (SBC) which approves funding for all projects associated with improvements to real property

SBC's chief staff officer responsible for implementing its by-laws, policies and procedures

Assist SBC in making informed and timely decisions

SBC's responsible party for recommending, then developing and implementing SBC approved initiatives, programs and policies

- facilitated through the three **S**tate **P**rocurement **A**gencies (**SPA**s) – DGS's STREAM, TBR and UT
- assisting SPAs so their projects are expeditiously approved and delivered efficiently and responsibly

SBC continues to be interested in considering any items which may achieve a higher and better use of taxpayer dollars spent on improvements to real property

Reasons I was selected State Architect include my previous private sector professional experience and ability to bring about meaningful process changes

I research and recommend for SBC's consideration items I believe may:

- create greater owner value and
- will lower the State's total cost of ownership through
  - more efficient and effective design, construction and operational processes
  - the realization of higher performing buildings throughout their entire life cycle

Examples of the types of items my office has either already brought forward and gained acceptance of or is currently researching which may be brought to the SBC for their consideration in the future include:

Owner items:

More efficient and effective approval and decision making processes at SBC, SPA and / or the design, construction, operations level. Examples include:

More delegation of duties from SBC to the OSA, F&A and SPAs to expedite small cost and low risk projects / transactions

- One recent delegation is:
  - Maintenance projects <$500,000 funded by certain sources can now be approved by my office and the budget office with only reporting after the fact back to the SBC

More consistency in SPA processes and reporting

- Example:
  - Change order approvals and reporting

Increased emphasis on SBC / OSA oversight and SPA leadership and management of project scopes, budgets and use contingency funds to reduce the number of Owner requested scope and budget revisions and related change orders

The State needs to be able to

- more accurately develop project scopes and budgets before budget requests are submitted and project funding is authorized, and
- better manage those projects to their approved targeted budgets

Examples:

- General government's / STREAM's **operational pre-planning** of projects
  - making a business case for each request prior to bringing it forward, as well as
  - to better define project scopes, expectations, and budgets before starting the design and construction process
  - to expedite project approvals, minimize future SBC revision requests, and have tighter project controls
- Furthering the Statewide use of **design and construction pre-planning** of projects to assist in scope definition and budgeting
  - development of a project's design, budget and schedule to the extent necessary for each project's specific needs
  - overlapping this pre-planning work with the budget request cycle thus shortening the time it takes from budget request to occupancy

These next items are only in the research and development phase prior to any SBC consideration. Before bringing these forward as part of any Owner initiative requires great efforts and thought especially when it requires industry involvement.

Part of my interest in talking about these items today is to further my research by getting your feedback and perspective on these items before actually bringing forward any of these items to the SBC for their consideration.

Design / Construction / Operations Team Items:

Next three items focus on improving value of project teams and building projects:

- Better utilization of various project delivery methods based on individual project needs, and owner expectations regarding project and project team performance
- Better utilization of design and construction team members who can provide greater value than currently being requested
- Increasing collaboration between designers and contractors during the design process and the early involvement of contractors

Project Delivery Options

"Traditional" Design-Bid-Build (D-B-B) delivery method continues to be most widely used delivery method, especially by the public sector

- Provides competitive bidding environment
- Provides clear separation of designer and contractor responsibilities and liabilities
- Requires the least effort by Owners on the front-end

However, D-B-B can sometimes

- Create adversarial relationships between the designers and contractors
- Award contracts to low bidders that aren't the most qualified
- Result in numerous Change Orders and RFIs
- Not always be the lowest cost method in the end

While D-B-B will remain the best choice on certain projects, many industry experts now realize other methods may be better suited for certain project types and situations

For instance, when a project is such that some or all of the following conditions exist:

- Scope is not well defined,
- Budget is not well defined,
- Schedule needs to be expedited,
- Complexity level is above average,
- Would benefit from early contractor involvement, and high levels of collaboration between the design and construction team members

OSA's current policy on Alternative Delivery Methods is based on the State's Quality in Construction (QIC) Task Force 's work product which provides a framework for selection of the most qualified designer and/or contractor.

- QIC was comprised of members from the design industry, construction industry and various state agencies that engage in building projects who met in 2004 and 2005 and reconvened in 2009 and 2010

QIC work product identified various "alternative" delivery methods beyond D-B-B

- Best Value 1, 2, and 3 (BV1, BV2, BV3) - requires two part contractor submittal, first creating a short list of qualified bidders whose lowest bid will determine who is awarded the contract
- Construction Manager/General Contractor (CM/GC) - brings a contractor in early in the design process, providing pre-construction services, to work with the designer and owner to contribute to cost estimating, scheduling, and constructability reviews
- Design-Build (D-B) – provides a single point for responsibility by bringing the designer and contractor in at the same time under one contract

Having options is valuable and appropriate

Each project has unique characteristics and requirements

Each project should assess and use the most appropriate Project Delivery method

SBC Policy approved the use of these new Alternative Delivery Methods occurred in December, 2005

The second Design / Construction / Operations Team Item:

Developing more High Performing Buildings (HPB)

- Higher Performing Buildings (HPB) are buildings with lower total costs of ownership and longer useful lives
- Now there is an increased appreciation by owners and the AEC industry on the benefits of High Performance Buildings (including but not limited to lower life cycle costs including utility and operations costs)
- Utilizing Alternative Delivery Methods on those projects often lends itself well to advancing the delivering of higher performing buildings

Summary of report - “Influence of Project Delivery on Sustainable, High Performance Buildings”

- November 2010
- University of Colorado research project funded by a grant through the Charles Pankow Foundation

To achieve HPB Goals, project complexity increases as does the demand for increased interdisciplinary collaboration including early involvement of participants, higher levels of communication, and compatibility (trust) between project team members

- Project delivery methods often impact the Owner’s ability to achieve higher levels of building performance
- Studies show Design-Bid-Build (D-B-B) strategies may not address the complex demands found in high performance building projects and actually may actually constrain the contractor’s ability to assist in achieving certain high performance building objectives

- Design team separation from the contractor reduces the opportunity for innovative solutions by the contractor and sub-contractors
- Additionally, the (early or late) timing of contractor involvement also is a key factor affecting a building's performance

In other words, it is very difficult to achieve high performance building outcomes without some form of integrated design process where the contractor is involved during the design process

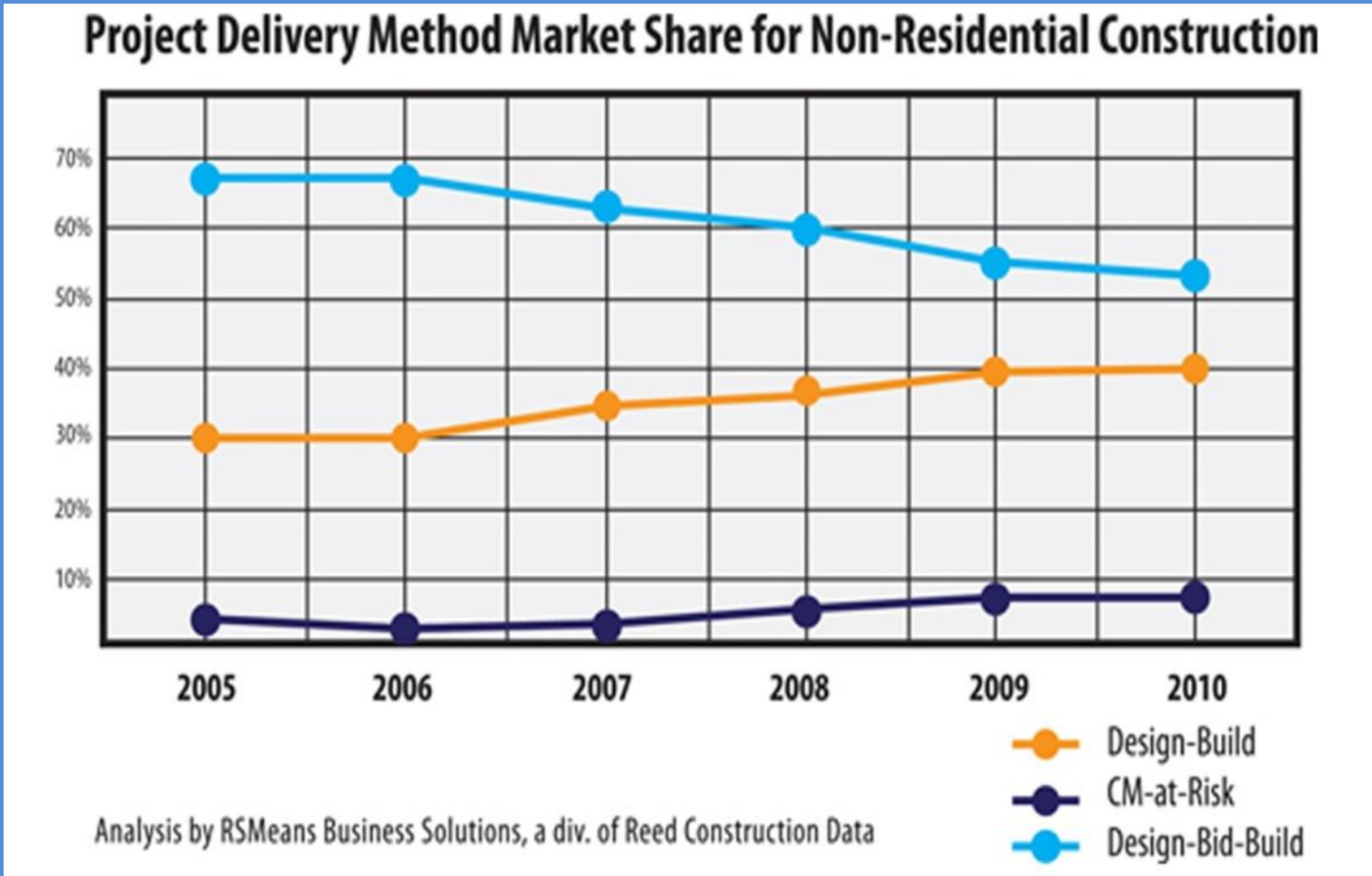
An analysis of Construction Delivery Methods for U.S. Non–residential Vertical Construction

2005

67%
D-B-B

30%
D-B

3%
CM/GC

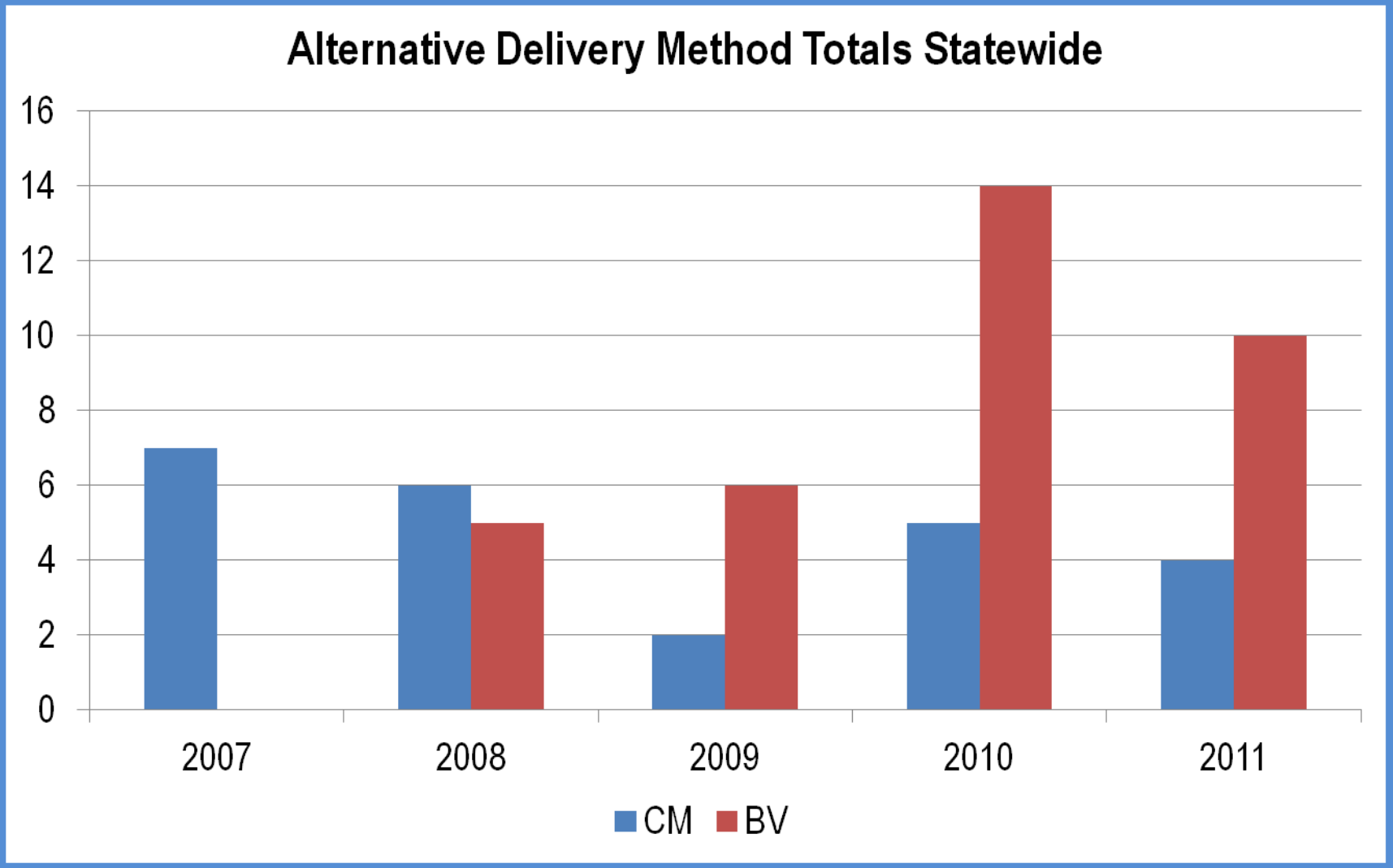


2010

52%
D-B-B

40%
D-B

8%
CM/GC


Alternative Delivery Method Totals Statewide
16
14
12
10
8
6
4
2
0
2007
2008
2009
2010
2011
CM
BV

The third Design / Construction / Operations Team Item:

Utilization of Building Information Modeling (BIM)

- Leveraging use of and sharing information through technology (like BIM and related tools) by the designer, contractor and Owner during design, construction and operations appears to potentially be of great value as the State continues to look for ways to benefit from higher performing project teams and projects as well as be more efficient and effective in its projects' delivery
- Utilization of technology, and BIM in particular, has been identified as extremely valuable tool to increase productivity of project teams and improve the quality control of built projects by
    - enabling critical communications and collaboration,
    - sharing of information between different parties,
    - to achieve high performance building goals
    - throughout a project's total life cycle of design, construction and operations

According to McGraw Hill Construction's report "The Business Value of BIM" conducted in 2007 and updated in 2009 and numerous other McGraw Hill Construction BIM reports in July 2009

Owners were looking for BIM to deliver results that can be seen in

- Project cost,
- Speed of delivery,
- Quality of the finished product

Owners using BIM on its projects said it saves time and/or money through

- Increased productivity / efficiency
- Improved coordination of drawings / documents
- Avoiding rework / changes

Additionally they said BIM projects have greater value due to

- Improved collective understanding of design intent
- Reduced conflicts during construction
- Improved overall project quality
- Providing data useful post construction

All industry users surveyed in this report said the top BIM benefits as of 2009 which contribute the most value include:

- Reduced conflicts during construction
    - Conflicts during construction are costly, and typically adversely affect both budget and schedule
    - Reducing conflicts rewards the entire project team - architects, engineers, contractors and the Owner
- Improved collective understanding of design intent
    - Thru 3D visualization and a rich database of project information
- Improved overall quality of the project's construction documents
- Reduced changes during construction
- Reduced number of RFIs (Requests for Information)
- Better cost control / predictability

The top BIM benefits anticipated in 2009 to contribute the most value by 2014 include:

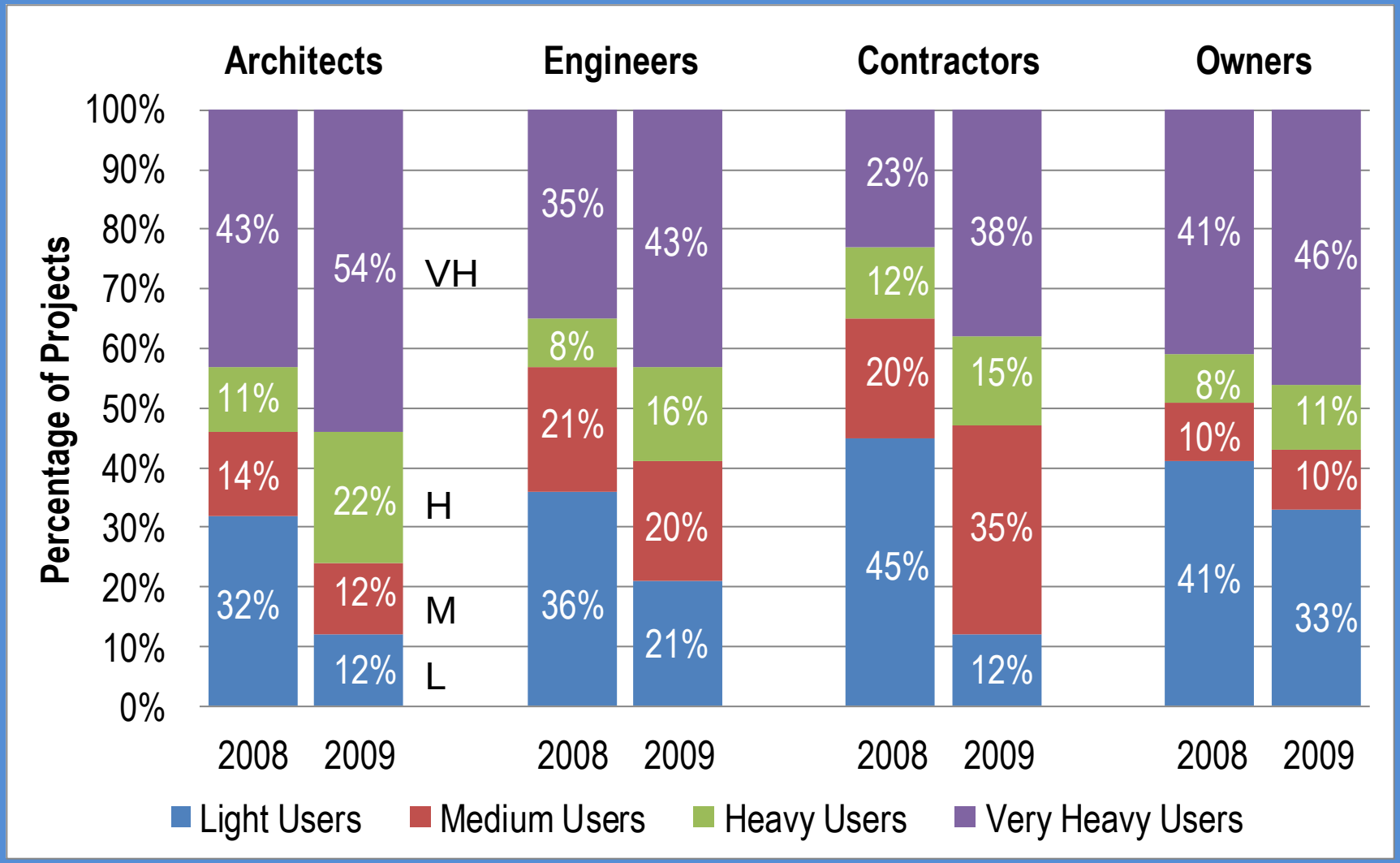
- Better designed projects
- Lower risk and better predictability of outcomes
- Prefabrication of larger, more complex parts of projects
- Reduced claims, disputes and conflicts
- Better performing buildings / infrastructure
- Faster delivery schedules
- Enhanced operations, maintenance, and facility management
- Lower construction costs
- Safer construction processes and sites

Regarding AEC industry adoption of BIM

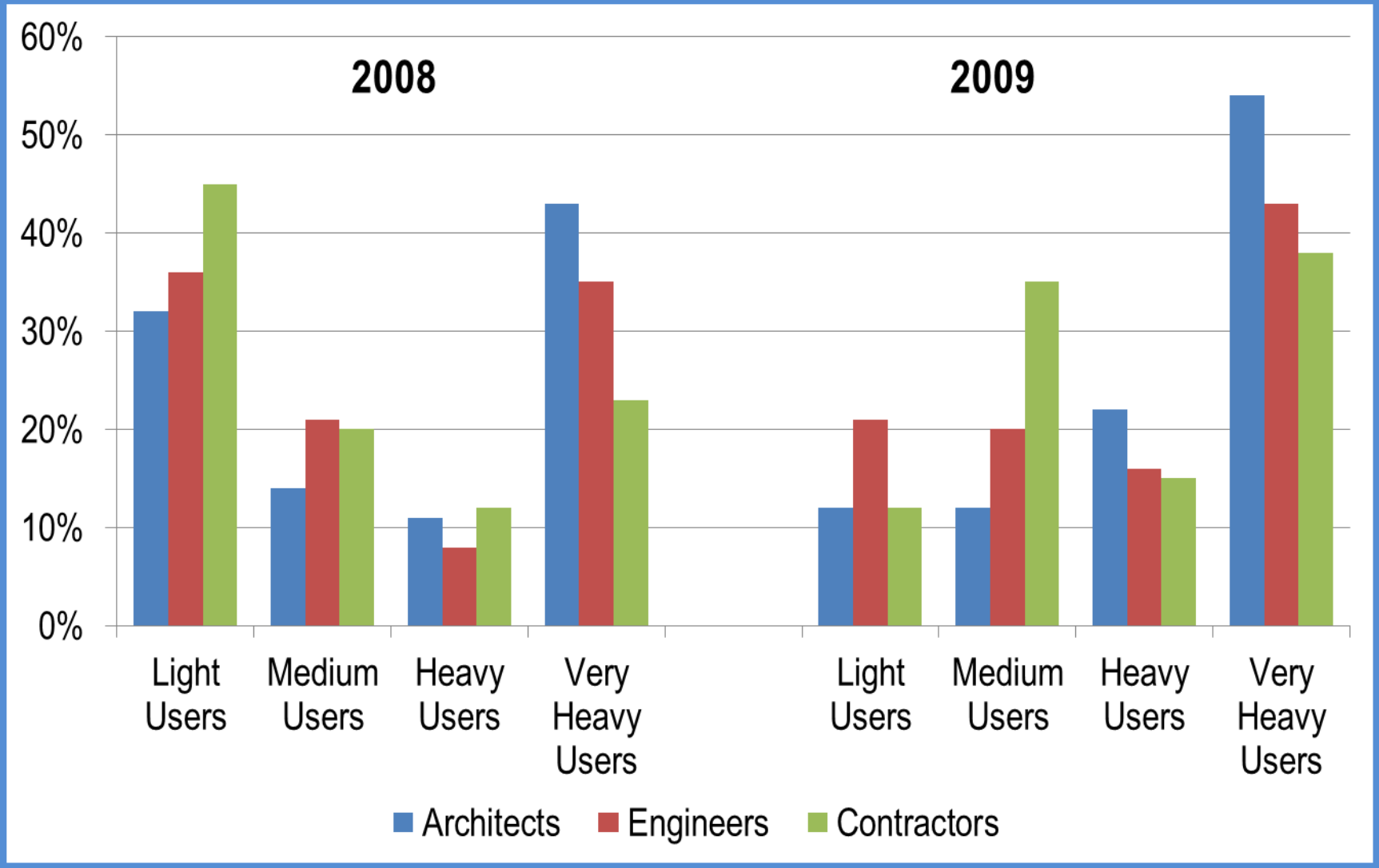
Fastest growing market segments adopting BIM as of 2009

- Public Work 35%
- Health Care 28%
- Education 24%
- Private and other 13%

Growth in BIM Use on Projects



Growth in BIM Use on Projects



So where is my office on these three items?

1) The SPAs are already looking at utilizing alternative delivery methods more often on some of their projects where appropriate

2) My office has initiated the process of selecting a High Performance Building consultant. Assuming they are retained, their scope will include such tasks as:

    - Return on Investment (ROI) policies
    - Life Cycle Cost Analysis models
    - Energy Modeling requirements
    - HPB Performance Specifications
    - Facility (Post Occupancy) Performance Evaluations/Metrics
    - Updating our Sustainable Design Guidelines (minimum project requirements)

Beyond that there are no definitive plans or SBC approvals to implement any new levels of HPB minimum requirements at this time. This initiative would provide the guidance for well informed decisions if and when any new policies are put in-place in the future.

3) My office has recently selected a BIM/Virtual Design & Construction consultant. Their scope for design, construction, and operations/facility management will include such tasks as:

- Model Development categories
- Model requirements (per project types and sizes)
- Level of Development (LOD) definition
- BIM Execution Plan (BEP) and Deliverables guide
- Implementation/Adoption Plan outline

As with the HPB, there are no definitive plans or SBC approvals to pilot test or require use of BIM on State of TN projects at this time. If and when the State decides to do a pilot BIM project this consultant's work will provide all the tools necessary for success.

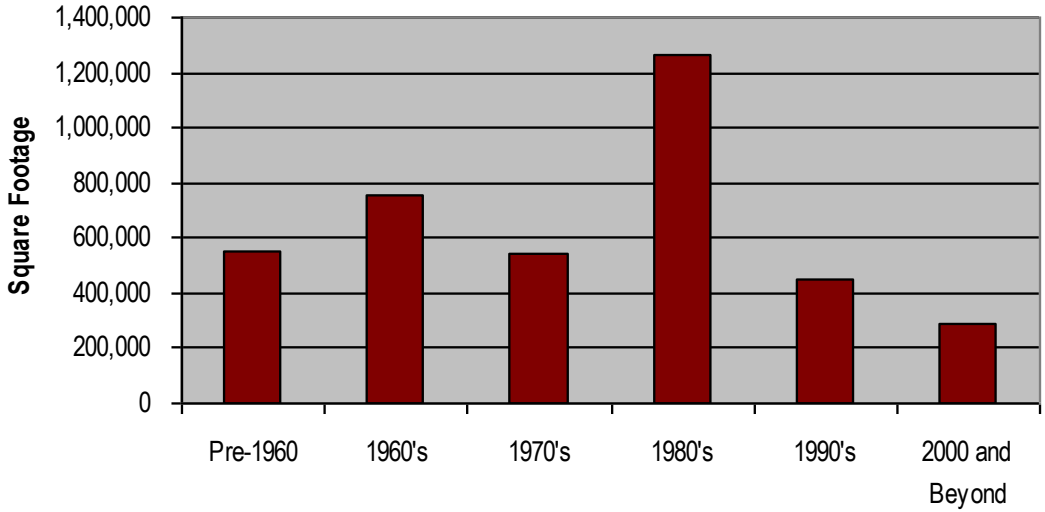
Facilities Assessment

Issue	Need	Action
1. Older Facilities with Significant Deferred Maintenance	▪ Invest needed capital to correct life safety and key deferred items	▪ Execute capital plan prioritized on life-safety, building systems, roofs, exterior and interior improvements
2. Facilities / Maintenance Management Approach	▪ Migrate from "run-to-fail" approach to preventative and predictive maintenance of systems ▪ Increase skill levels and reduce headcount to perform more work in-house vs. contract	▪ Establish and implement modern processes, practices and an organization for reliable maintenance management ▪ Redesign maintenance model to cross train and increase skills/ training
3. Quality Control	▪ Establish and implement a disciplined quality and audit function to ensure risk management issues are being addressed	▪ Create and implement a disciplined quality, audit and performance management program
4. High Operating Costs	▪ Monitor and measure activity at high demand locations ▪ Bundle work where applicable ▪ Reduce costs on service contracts and energy	▪ Execute on new maintenance strategy linked to an energy strategy ▪ Manage maintenance and contract services performance ▪ Bundle work more effectively
5. Support & Automation	▪ Include a support infrastructure along with modern tools and technology to create leverage as well as actively manage performance of all work	• Establish and implement a model that integrates support subject matter experts and technology tools to create leverage, as well as operational and cost efficiency

Master Planning Overview

Current Buildings

- Average Age of Owned Portfolio is 35 years
- However, the oldest 43% of the portfolio has an average age of 50 years
- Architecture and technology have surpassed current portfolio



Chattanooga State Office Building
Built 1955

Donnelley J. Hill
Built 1968

Lowell Thomas State Office Building
Built 1977

Citizen's Plaza
Built 1986

Davy Crockett
Built 1989

Master Planning Goals

- Better utilization of State facilities - allows us to access the needs of the State moving forward

- Becoming proactive versus reactive to the needs of our employees and of our facilities

- Increasing sustainability and energy efficiency – moving into the 21st century

Project T3 Results

- Eliminating approximately one million (1M) square feet of lease space
- Anticipated savings of $102,717,126 over a ten year period

Owned Assets		
Building	Pre-T3 Cost per FTE	Post T3 Total Cost Per Person
Tennessee Tower	$5,818	$3,566
Andrew Jackson Building	$3,743	$2,309
Citizen's Plaza	$2,994	$2,797
Andrew Johnson Building	$3,069	$2,527
Davy Crockett Building	$5,849	$5,398
James K. Polk Building	$3,853	$3,798
665 Mainstream	N/A	$2,725
220 French Landing	$3,976	$1,987
UCRHF	$6,174	$4,134
Donnelly J Hill Building	$5,936	$1,784
Chattanooga State Office Building	$5,490	$3,887
MAPP	$3,575	$2,971
Lowell Thomas	$3,888	$2,173
Middlebrook	$5,102	$4,476
East TN Regional Health Facility	$2,478	$2,060
Cordell Hull Building	$4,077	$4,077
Rachel Jackson Building	$4,359	$3,614
Henley State Office Building	$4,425	Dispose

Project T3 will reduce total cost by $725 per person.

Pre-planning of Projects

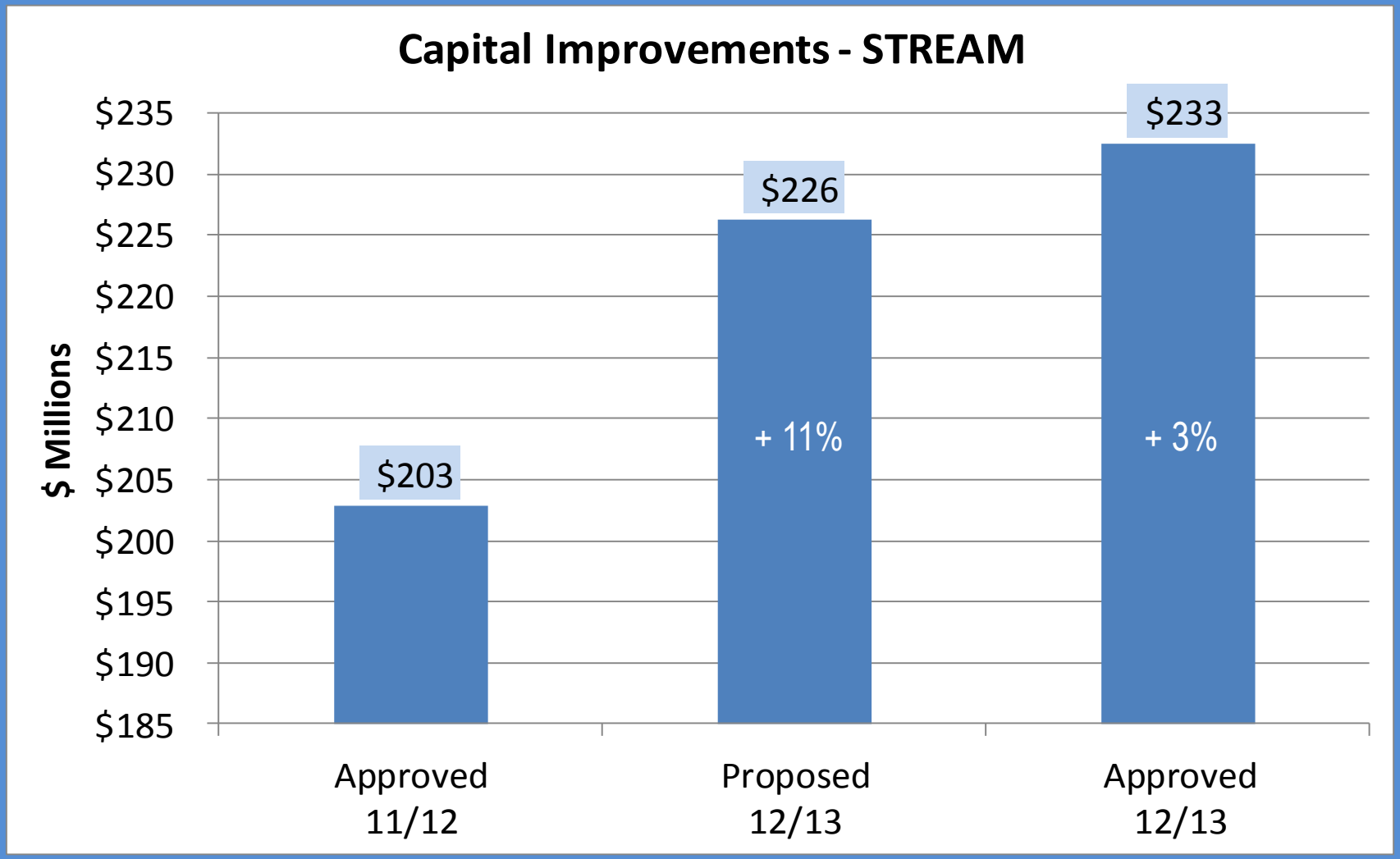
The scope of the project should be based on:

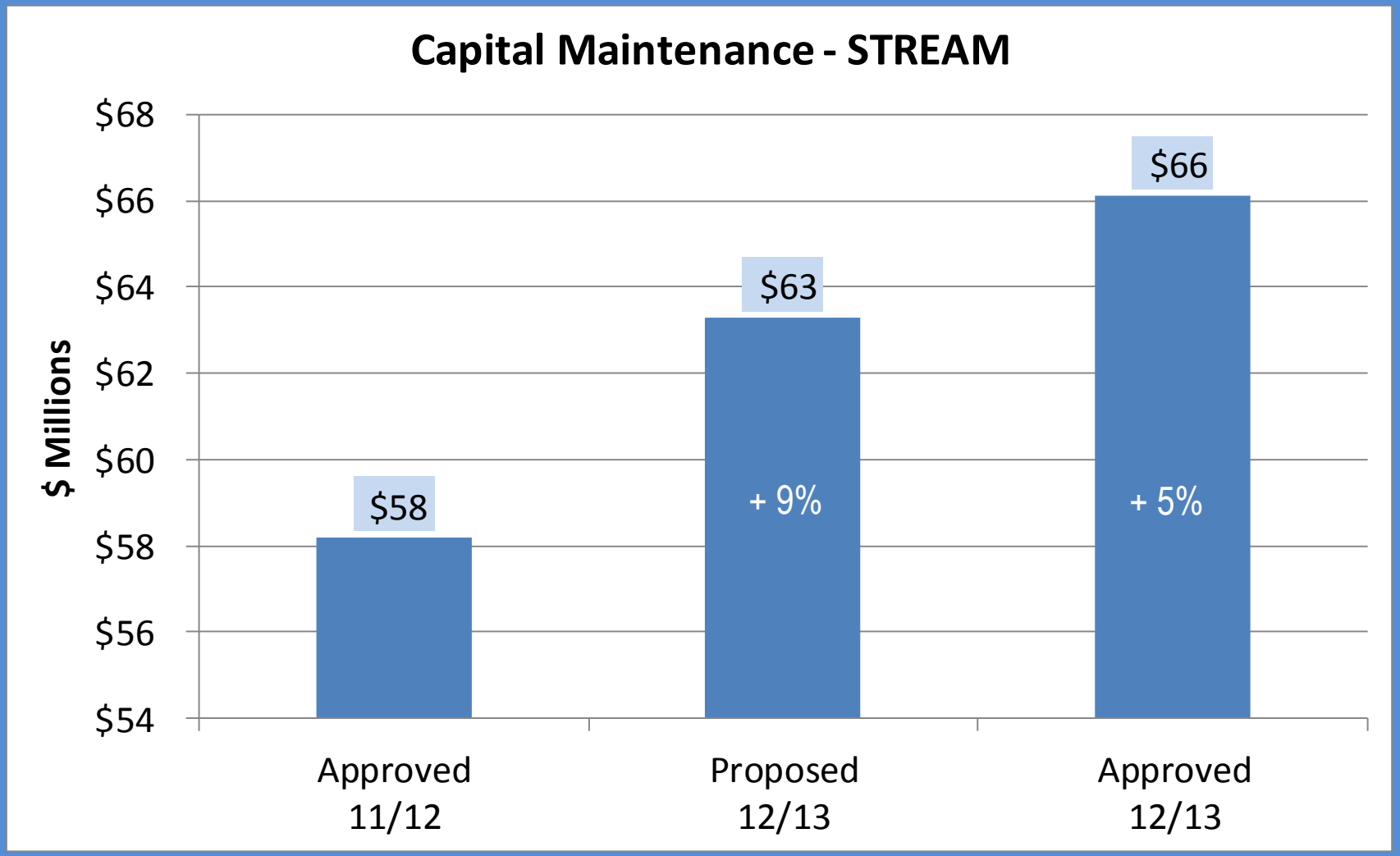
- Agency needs
- Feasibility of the goal
- Current market conditions
- Long term operating costs

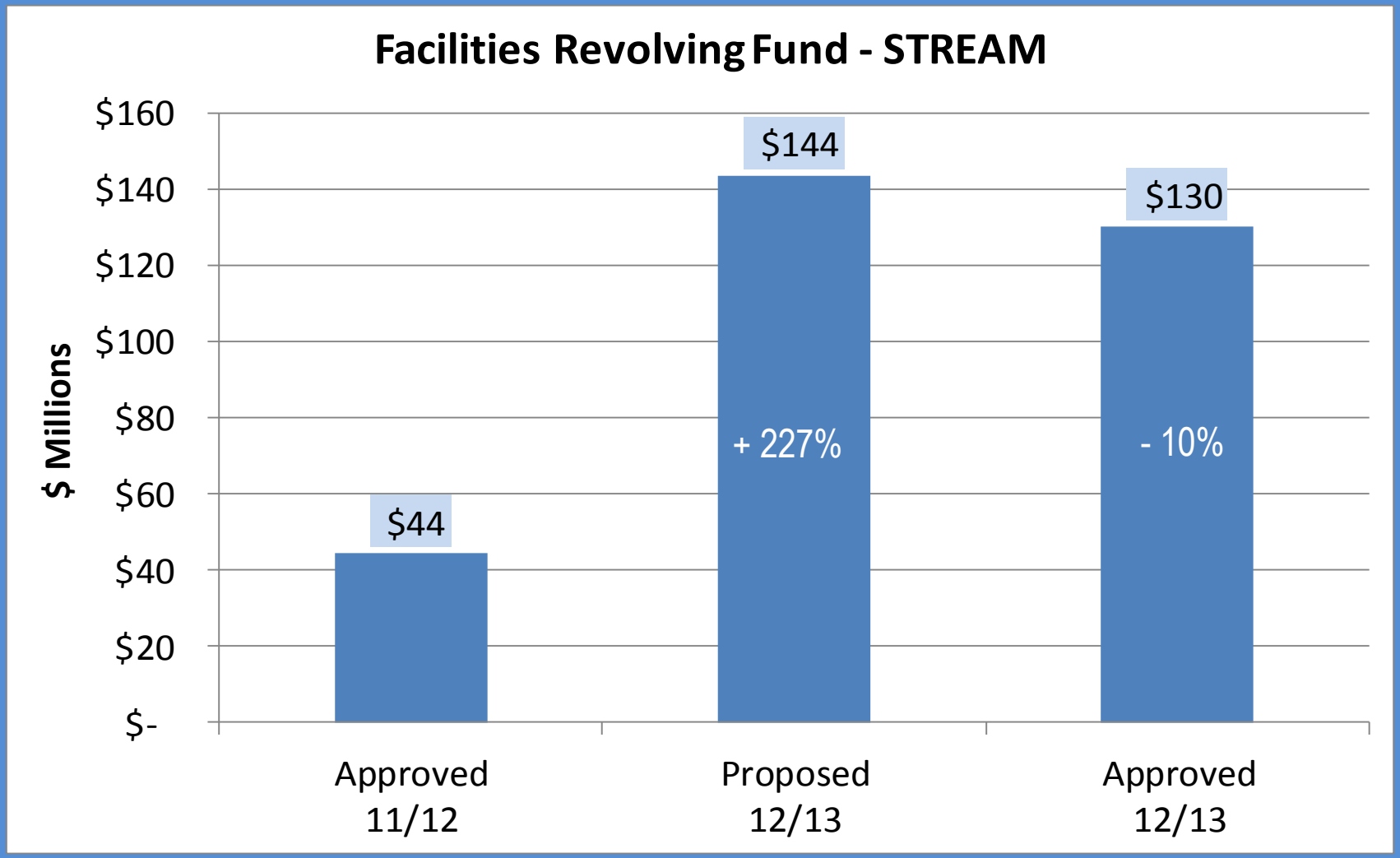
STREAM Moving Forward

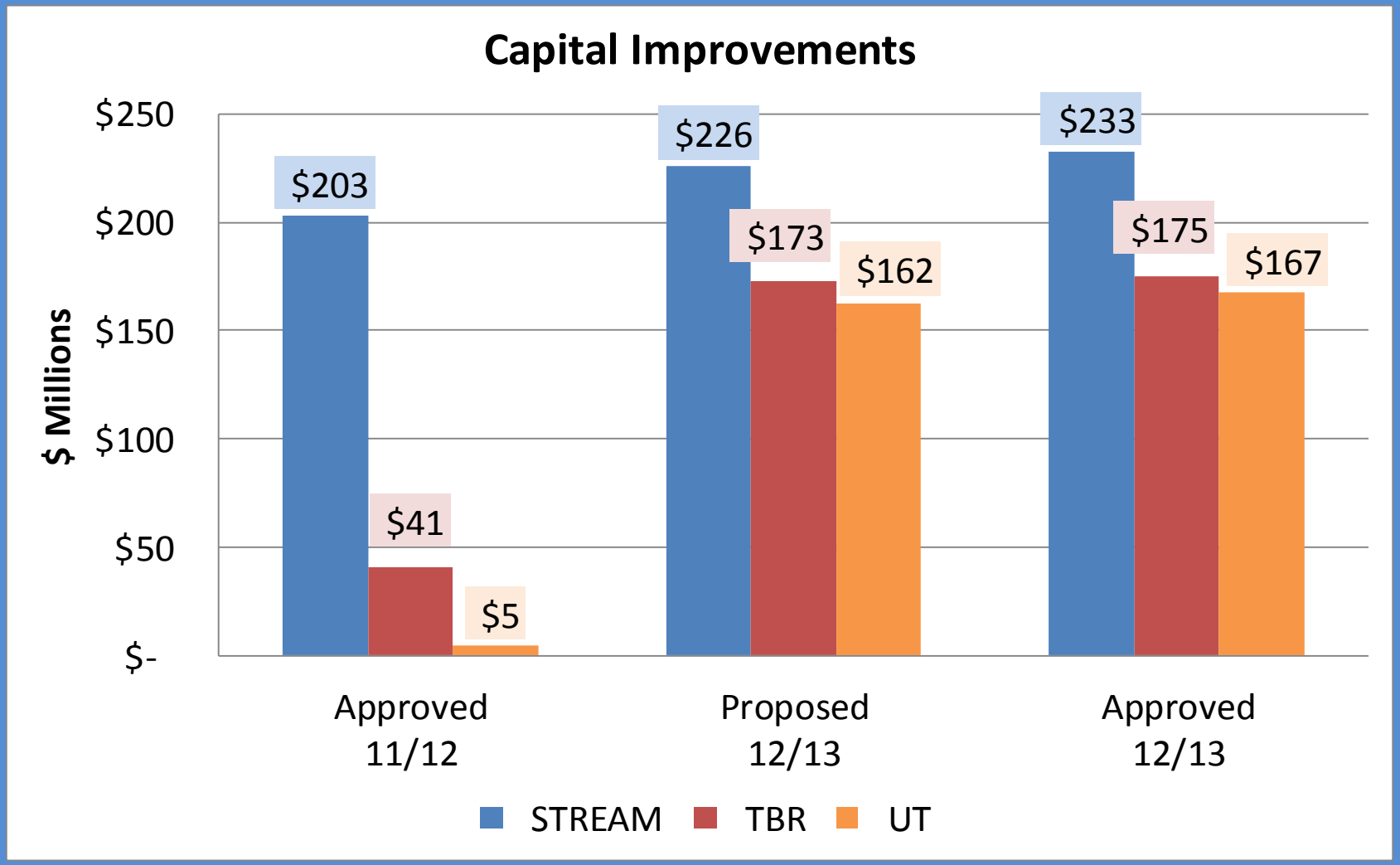
- Prequalification for construction contracts
- Utilization of construction managers
- Direct-Construction Process
  - How will it work and how will it benefit you?
- Project Management Office

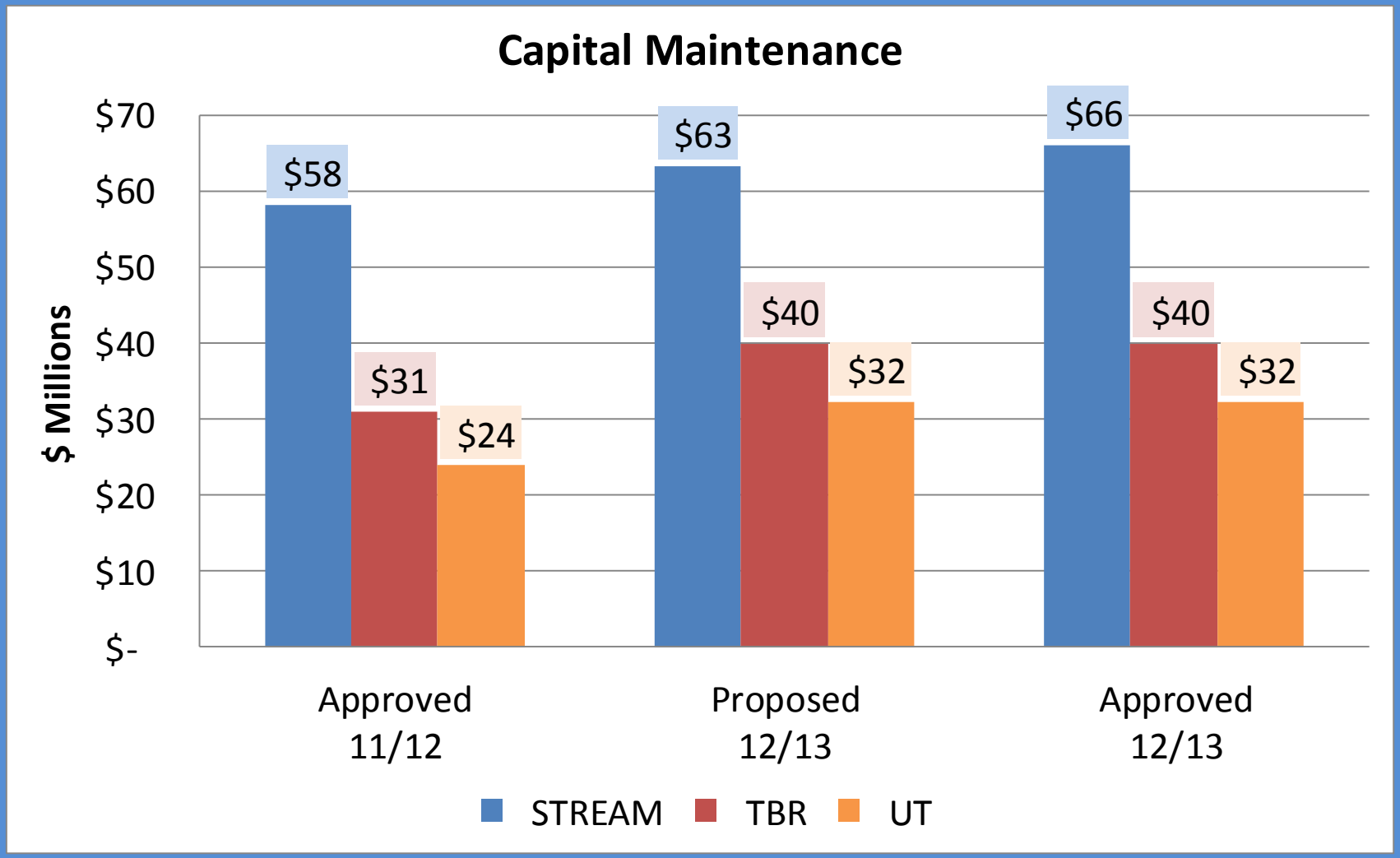
Capitol Renovations

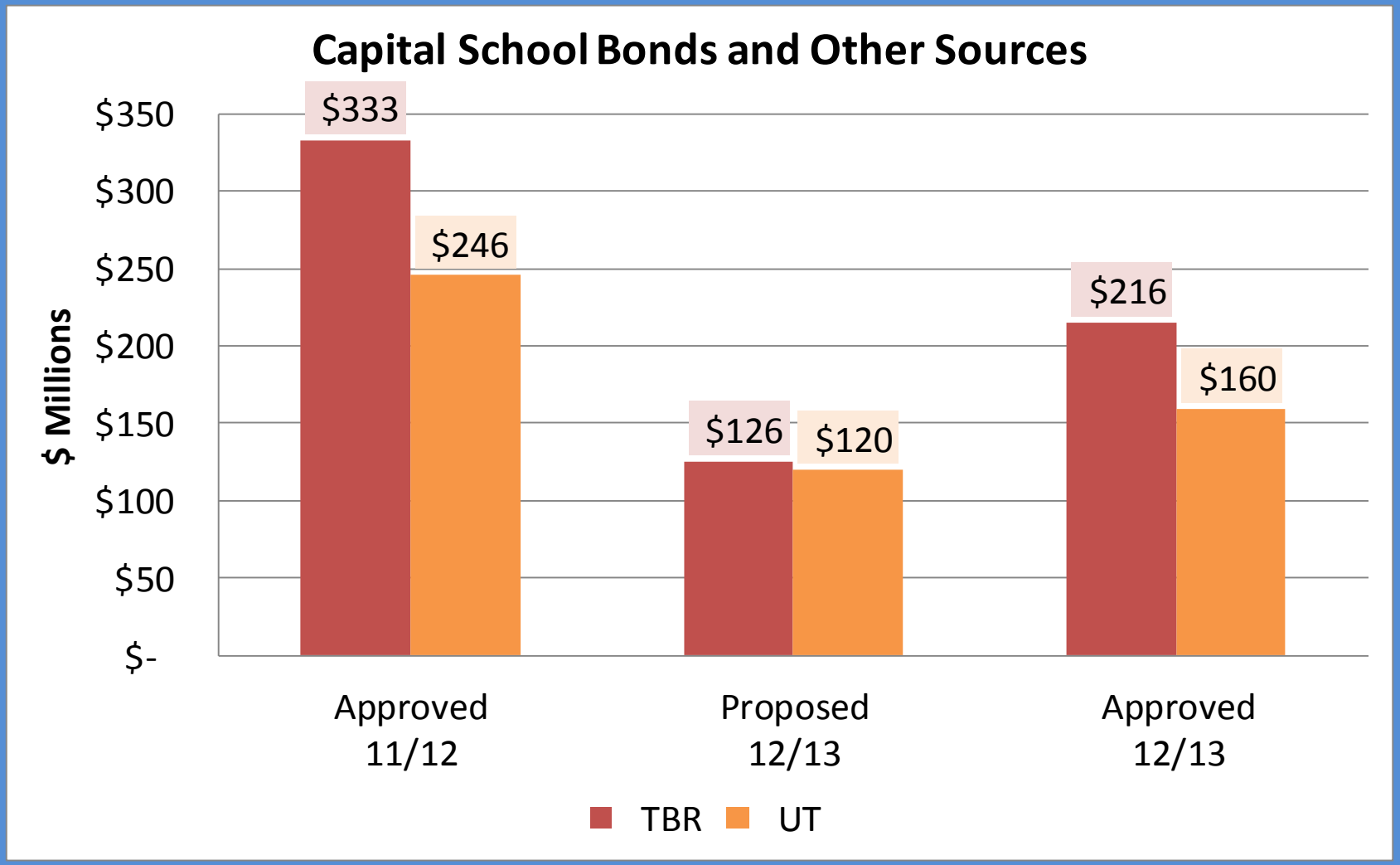

Capital Improvements - STREAM
$ Millions
$235
$230
$225
$220
$215
$210
$205
$200
$195
$190
$185
$203
$226
+ 11%
$233
+ 3%
Approved 11/12
Proposed 12/13
Approved 12/13

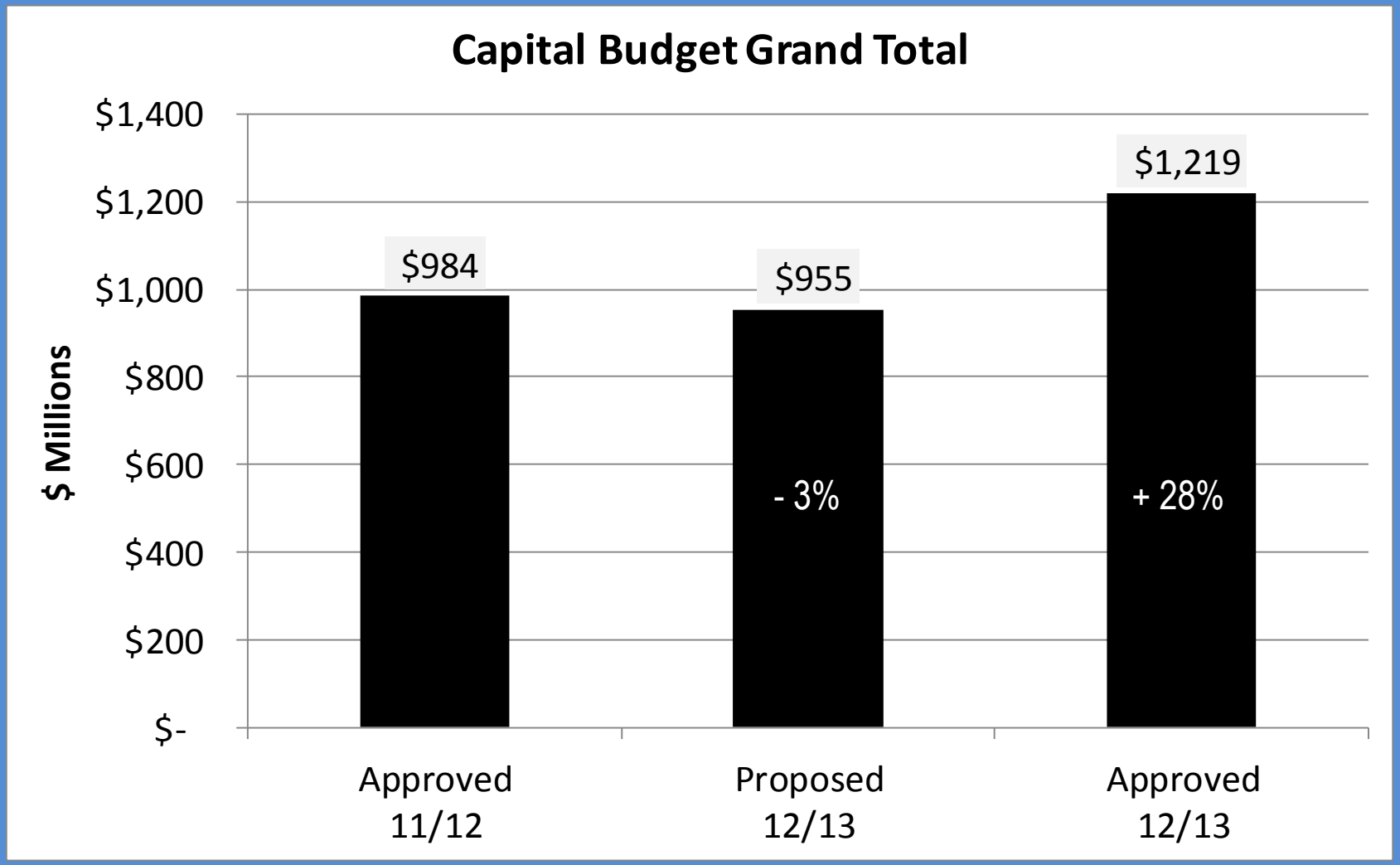

Capital Maintenance - STREAM
$ Millions
$68
$66
$64
$62
$60
$58
$56
$54
$58
$63
+ 9%
$66
+ 5%
Approved 11/12
Proposed 12/13
Approved 12/13


Facilities Revolving Fund - STREAM
$ Millions
$160
$140
$120
$100
$80
$60
$40
$20
$-
$44
$144
+ 227%
$130
- 10%
Approved 11/12
Proposed 12/13
Approved 12/13


Capital Improvements
$ Millions
$250
$200
$150
$100
$50
$-
$203
$41
$5
$226
$173
$162
$233
$175
$167
Approved 11/12
Proposed 12/13
Approved 12/13
STREAM
TBR
UT


Capital Maintenance
$ Millions
$70
$60
$50
$40
$30
$20
$10
$-
$58
$31
$24
$63
$40
$32
$66
$40
$32
Approved 11/12
Proposed 12/13
Approved 12/13
STREAM
TBR
UT


Capital School Bonds and Other Sources
$ Millions
$350
$300
$250
$200
$150
$100
$50
$-
$333
$246
$126
$120
$216
$160
Approved 11/12
Proposed 12/13
Approved 12/13
TBR
UT


Capital Budget Grand Total
$ Millions
$1,400
$1,200
$1,000
$800
$600
$400
$200
$-
$984
$955
$1,219
- 3%
+ 28%
Approved 11/12
Proposed 12/13
Approved 12/13

Questions for the Audience

Construction Delivery Methods

1. How many of you work in offices where each of the construction delivery methods used on your construction projects exceeds the stated industry average
    - 53% with D-B-B (including Best Value)
    - 41% with D-B
    - 6% with CM/GC

2. How many of you would encourage a public Owner to consider the use of alternative delivery methods (integrated design and construction team approach) in addition to D-B-B when appropriate? Project delivery methods include:
    - Best Value
    - CM/GC
    - D-B 1 (limited or no designer / documents)
    - D-B 2 (full service designer / documents)
    - IPD

3. Of the delivery methods being discussed,
    - D-B-B
    - Best Value
    - CM/GC
    - D-B 1 (limited or no designer / documents)
    - D-B 2 (full service designer / documents)
    - IPD

    Would you expect the D-B-B delivery method will most often result in the least
    a. Number of RFIs?
    b. Number of Change Orders?
    c. Number of time delays?
    d. Cost of construction?
    e. Cost of operations?

4. How many of you believe that more integrated design and construction team alternative delivery methods allow for better
    a. Final design and constructed solutions?
    b. Higher performing buildings?

High Performing Building Designs

5. How many of your offices are providing high performing building designs to 60% or more of your clients whether requested by them or not?

6. How many of you believe that high performing building designs can lower the total cost of ownership (utility, operating and maintenance costs)?

7. How many of you believe an Owner requiring a 24 month long post construction warranty period would encourage more quality in design and construction?

8. How many of you believe a design team's use of BIM will more often than not result in achieving a higher level of
    a. construction quality?
    b. building performance (lower utility, operating and maintenance costs)?

Building Information Modeling

9. How many of you are using BIM on a daily basis in your office?

10. How many of you would generally support a public Owner's requirement to use BIM on certain types and sizes of projects say two years from now?

11. Those of you who just said you are using BIM on a daily basis in your office, how many of you:
    a. Are using BIM on 60% or more of your projects of the descriptions provided in the previous question?
    b. Do you consider your office advanced or expert users?

12. How many of you believe the Owner's use of the project's design and construction team's BIM will more often than not result in achieving more effective owner provided operations, facilities management, etc. over a building's life cycle?

13. How many of you using BIM believe it
    a. Improves collective understanding of design intent?
    b. Reduces changes associated with coordination conflicts during construction?
    c. Improves overall quality of construction documents?
    d. Provides useful owner data for post construction use during the building's life cycle?
    e. Improves coordination of drawings?

14. How many are using BIM on projects for the
    a. Public sector?
    b. Private sector?

Questions and Answers

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